

Office Action Response
U.S.S.N. 09/890,290
Page No. 2

IN THE CLAIMS:

Please amend the claims as set forth in the following Claim Listing:

CLAIM LISTING:

1-32. (Cancelled).

33. (Currently Amended) A perfluorinated thermoplastic resin filtration cartridge comprising:

a housing having an inlet and an outlet; and

one or more membrane filters located between the inlet and the outlet;

sealing means forming ~~so as to form~~ a liquid-tight seal between the one or more membrane filters and the outlet;

such that an integral filtration device is formed, wherein all fluid must pass through the one or more membrane filters from the inlet to the outlet;

wherein the seal and the one or more membrane filters are formed of perfluorinated thermoplastic resins,

said ~~resin~~ membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins with a particle size in the range of approximately 100 to 1000 microns,

said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof; and

wherein the sealing means has a melting point equal to or less than that of the membrane filter resins.

Office Action Response
U.S.S.N. 09/890,290
Page No. 3

34. (Previously Presented) The filtration cartridge of Claim 33, wherein the membrane filter comprises a filter having two surfaces with a porous wall between.

35. (Previously Presented) The filtration cartridge of Claim 34, wherein the membrane filter comprises a pleated flat sheet membrane.

36. (Previously Presented) The cartridge of claim 33, wherein the membrane is selected from the group consisting of hollow fibers, flat sheets and wound fibers.

37. (Previously Presented) The cartridge of claim 33, wherein the membrane is in the form of a flat sheet, said flat sheet membranes being formed into a shape selected from the group consisting of pleats, spirals and discs.

38. (Currently Amended) A perfluorinated thermoplastic resin filtration cartridge comprising:
a housing having an inlet and an outlet; and
one or more membrane filters located between the inlet and the outlet;
sealing means forming a liquid-tight seal between the one or more membrane filters and the outlet;
such that an integral filtration device is formed, wherein all fluid must pass through the one or more membrane filters from the inlet to the outlet;
wherein the seal and the one or more membrane filters are formed of perfluorinated thermoplastic resins,
said membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins,

Office Action Response
U.S.S.N. 09/890,290
Page No. 4

said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof; and

wherein the sealing means has a melting point equal to or less than that of the membrane filter resins;

~~The cartridge of claim 33,~~ wherein the membrane is a depth filter formed of one or more wound fibers.

39. (Previously Presented) The cartridge of claim 33, wherein the membrane is formed of a series of hollow fiber membranes having at least one end of said fiber membranes potted in a block of perfluorinated thermoplastic resin.

40. (Currently Amended) The cartridge of claims 33, 34, 35, 36, 37, 38 or 39, wherein the perfluorinated thermoplastic polymer is poly (tetrafluoroethylene)-co-perfluoro (alkylvinylether)) and the alkyl is selected from the group consisting of propyl, methyl and blends of propyl and methyl.

41. (Currently Amended) A perfluorinated thermoplastic resin filtration cartridge comprising:

a housing with a first and a second end, wherein the housing has at least one fluid inlet or outlet means;

a membrane filter having two surfaces with a porous wall between, with two ends, located within the housing;

wherein the membrane filter comprises a plurality of hollow fiber membranes having an outer diameter and an inner diameter;

sealing means to seal each end of the membrane filter into a shaped form, so that a sealed membrane end is within the housing at or near the first end of the housing and

Office Action Response
U.S.S.N. 09/890,290
Page No. 5

the seal of the other end of the membrane filter is at or near the second end of the housing;

wherein the sealing means and the membrane filter are formed of perfluorinated thermoplastic resins,

said ~~resin~~ membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins with a particle size in the range of approximately 100 to 1000 microns,

said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof;

wherein the inner diameters of the fibers are open to fluid flow passing from outside the housing to the inside of the housing across the fiber seal, whereby the fluid will pass through the membrane filter and become separated from a portion of the filtered substance, and the fluid passing through the membrane filter will exit housing through the outlet means of the housing.

42. (Previously Presented) The filtration cartridge of Claim 41, wherein the filter membrane fibers are open at both ends to fluid flow.

43. (Previously Presented) The cartridge of claims 41 or 42, wherein the perfluorinated thermoplastic polymer is poly (tetrafluoroethylene)-co- perfluoro (alkylvinylether)) and the alkyl is selected from the group consisting of propyl, methyl and blends of propyl and methyl.

44. (Previously Presented) The cartridge of claims 41 or 42, further comprising one or more end caps for the housing wherein the end caps are formed of perfluorinated thermoplastic resin.

Office Action Response
U.S.S.N. 09/890,290
Page No. 6

45. (Currently Amended) A filter cartridge made substantially of perfluorinated thermoplastic polymers comprising;

- a) a perfluorinated thermoplastic polymer housing having an inlet and an outlet for fluid flow,
- b) a perfluorinated thermoplastic polymer membrane filter formed by thermally induced phase separation and liquid-liquid phase separation positioned in said housing to filter a fluid containing filterable substances, said filter interposed between a fluid entering said housing inlet and said fluid exiting said housing outlet after being filtered, said one or more membranes being formed of fibrils,
- c) a perfluorinated thermoplastic polymer liquid tight seal to prevent said fluid entering the housing from mixing with said filtered fluid exiting the housing, said seal encapsulating a portion of said membrane filter and said seal having a melting point equal to or less than that of the membrane polymer,

wherein the housing, the membrane filter, and the liquid tight seal are formed of perfluorinated thermoplastic resins,

said resin membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins with a particle size in the range of approximately 100 to 1000 microns,

said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof.

46. (Previously Presented) The filter cartridge of Claim 45, wherein the membrane is a microporous membrane.

47. (Previously Presented) The filter cartridge of Claim 45, wherein the membrane is an ultrafiltration membrane.

Office Action Response
U.S.S.N. 09/890,290
Page No. 7

48. (Previously Presented) The filter cartridge of Claim 45, wherein an end cap is liquid tightly joined to each end of the housing.

49. (Previously Presented) The filter cartridge of Claim 45, wherein the end caps and the housing form a unitary end structure.

50. (Previously Presented) The filter cartridge of Claims 45, 46, 47, 48, 49 or 50, wherein said perfluorinated thermoplastic polymer is poly(tetrafluoroethylene-co-perfluoro(alkylvinylether)).

51. (Previously Presented) The filter cartridge of Claim 50, wherein the alkyl of said poly(tetrafluoroethylene-co-perfluoro(alkylvinylether)) is selected from the group consisting of propyl, methyl, and blends of methyl and propyl.

52. (Previously Presented) The filter cartridge of Claim 45, wherein the seal material has a lower melting temperature than the melting or softening temperature of the material used to make the membrane.

53. (Previously Presented) The filter cartridge of Claim 45, wherein the melting or softening temperature of the seal material is at least about 5°C lower than the melting temperature of the material used to make the membrane.

54. (Previously Presented) The filter cartridge of Claim 45, wherein the melting temperature of the seal material is at least about 10°C lower than the melting or softening temperature of the material used to make the membrane.

Office Action Response
U.S.S.N. 09/890,290
Page No. 8

55. (Currently Amended) A filter cartridge made substantially of perfluorinated thermoplastic polymers, said filter cartridge comprising a cylindrical form and further comprising;

- a) a perfluorinated thermoplastic polymer housing having two ends, having at least one fluid inlet,
- b) cylindrical perfluorinated thermoplastic polymer membrane filter, said membrane formed by thermally induced phase separation and liquid-liquid phase separation, said filter arrangement having a generally annular form and having two ends, said membrane filter positioned in said housing to filter a fluid containing filterable substances,
- c) a perfluorinated thermoplastic polymer liquid tight seal at each end of said membrane filter, said seal encapsulating a portion of said each end of said membrane filter,
- d) at least one outlet communicating with the center of said cylindrical membrane filter through at least one of said liquid tight seals to recover fluid filtered by said membrane filter,
- e) said seal further comprising a liquid tight junction with a portion of the entire periphery of the inner surface of the housing, and said seal having a melting point equal to or less than that of the membrane polymer,
- f) wherein the housing, the membrane filter, and the liquid tight seal are formed of perfluorinated thermoplastic resins,
said ~~resin~~ membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins with a particle size in the range of approximately 100 to 1000 microns,
said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof.

Office Action Response
U.S.S.N. 09/890,290
Page No. 9

56. (Previously Presented) The filter cartridge of Claim 55, wherein the membrane filter is a pleated membrane.

57. (Previously Presented) The filter cartridge of Claim 55, wherein said pleated membrane is supported by a perfluorinated thermoplastic fabric.

58. (Previously Presented) The filter cartridge of Claim 55, wherein the membrane is a microporous membrane.

59. (Previously Presented) The filter cartridge of Claim 55, wherein the membrane is an ultrafiltration membrane.

60. (Previously Presented) The filter cartridge of Claim 55, wherein an end cap is liquid tightly joined to each end of the housing.

61. (Previously Presented) The filter cartridge of Claim 55, wherein the end caps and the housing form a unitary end structure.

62. (Previously Presented) The filter cartridge of Claim 55, wherein said perfluorinated thermoplastic polymer is poly(tetrafluoroethylene-co-perfluoro(alkylvinylether)).

63. (Previously Presented) The filter cartridge of Claim 62, wherein the alkyl of said poly(tetrafluoroethylene-co-perfluoro(alkylvinylether)) is selected from the group consisting of propyl, methyl, and blends of methyl and propyl.

64. (Currently Amended) A filter cartridge made substantially of perfluorinated thermoplastic polymers comprising;

Office Action Response
U.S.S.N. 09/890,290
Page No. 10

- a) a perfluorinated thermoplastic polymer housing having two ends, having an inlet and an outlet, and having an inner surface and an outer surface,
- b) a bundle of a plurality of perfluorinated thermoplastic hollow fiber membranes formed by thermally induced phase separation and liquid-liquid phase separation having a first end and a second end, said membranes having an outer surface and an inner surface, said inner surface comprising a lumen,
- c) at least one of said ends of said bundle potted with a liquid tight perfluorinated thermoplastic seal wherein each fiber of said plurality is separately sealed and at least one of said bundle ends the fiber ends are open to fluid flow,
- d) said seal further comprising a liquid tight junction with a portion of the entire periphery of the inner surface of the housing, and said seal having a melting point equal to or less than that of the membrane polymer,
- e) wherein the housing, the membrane filter, and the liquid tight seal are formed of perfluorinated thermoplastic resins,
said ~~resin~~ membrane formed by thermally induced phase separation from perfluorinated thermoplastic resins with a particle size in the range of approximately 100 to 1000 microns, and
said resins being selected from the group consisting of poly (tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly (tetrafluoroethylene-co-hexafluoropropylene)) and blends thereof.

65. (New) The cartridge of claim 38, wherein the perfluorinated thermoplastic polymer is poly (tetrafluoroethylene)-co-perfluoro (alkylvinylether)) and the alkyl is selected from the group consisting of propyl, methyl and blends of propyl and methyl.

REMAINDER OF PAGE INTENTIONALLY BLANK